MARKED-UP VERSIONS OF THE AMENDED CLAIMS

1. (Four Times Amended) A planarization method of inter-layer dielectrics, comprising the steps of:

providing a semiconductor substrate including a field oxide, a source, a drain, and a gate formed thereon;

forming a dielectric layer used as an inter-layer dielectric on said semiconductor substrate~~;~~,;

lapping said dielectric layer by means of a chemical mechanical polishing; and

forming on said lapped dielectric layer a cap layer of silicon nitrogen-oxide to have a refractive index of at least ~~larger than~~ 1.6, wherein said cap layer is ~~a silicon nitrogen-oxide layer~~ translucent to ultra-violet light.

9. (Four Times Amended) A planarization method of inter-metal dielectrics, comprising the steps of:

providing a semiconductor substrate having a plurality of metal-interconnects formed thereon;

forming a dielectric layer used as an inter-metal dielectric on said substrate~~;~~,;

lapping said dielectric layer by means of a chemical mechanical polishing; and

forming on said lapped dielectric layer a cap layer of silicon nitrogen-oxide to have a refractive index of at least ~~larger than~~ 1.6, wherein said cap layer is ~~a silicon nitrogen-oxide layer~~ translucent to ultra-violet light.

REMARKS

This case has been carefully reviewed and analyzed in view of the Official Action dated 10 February 2003. Responsive to the rejections made in the Official Action, Claims 1 and 9 have been amended to clarify the recitation of method steps which form the invention of the subject Patent Application.

In the Official Action, the Examiner rejected Claims 1-4 and 9-15 under 35 U.S.C. § 103(a) as being unpatentable over Andideh (U.S. Patent #6,191,050) in view of Ang, et al. (U.S. Patent #6,232,217; hereinafter Ang). The Examiner found that Andideh discloses a dielectric layer forming process including the steps of: providing a semiconductor substrate having devices such as a field oxide, a source, drain and a gate already disposed thereon; forming a dielectric layer used as an inter-layer dielectric on the semiconductor substrate; lapping the dielectric layer by means of a chemical mechanical polishing; and forming an oxide layer. The Examiner admits that Andideh does not disclose forming a cap layer of high refractive index on the lapped dielectric layer and relies on Ang for such disclosure. The Examiner found that Ang discloses a semiconductor structure that includes exposed semiconductor devices or interconnect lines and a dielectric layer forming process including the steps of: forming an inter-layer dielectric and chemical-mechanical polishing; and forming a capping layer that may be comprised of silicon nitride, silicon oxynitride or silicon-rich oxide. The Examiner then

stated that Ang shows a cap layer having a refractive index not less than 1.6, however, the limitation of a specific refractive index is not explicitly disclosed or suggested in the reference.

Throughout the prosecution of this case, Applicants have maintained that the combination of Andideh and Ang, neither alone nor in combination with one another, disclose or suggest the use of a dielectric cap layer having a specific refractive index. In response to these arguments, as recently as in the Official Action of 10 February 2003, the Examiner has concluded that "Ang et al. disclose the same materials used in the present invention, therefore the material disclosed in Ang et al. has a refraction index of 1.6." It is respectfully submitted that the Examiner has erred in this conclusion.

It is well known in the art that the properties of materials may be manipulated by controlling the stoichiometry during the deposition of the material. In the case of silicon oxynitride, the refractive index ranges from approximately 1.45 to approximately 2.3 depending on the method of deposition of the dielectric material. This is shown in the Exhibits attached to this Amendment. EXHIBIT A is an Abstract of a paper by Sandland, et al., in which the authors indicate that for silicon oxynitride, the refractive index is tunable to between 1.46 and 2.3. EXHIBIT B shows that for plasma enhanced chemical vapor deposition of silicon oxynitride, the range of the refractive index is between 1.45 and 2.02. Thus, the refractive index of the oxynitride film varies as a

function of the stoichiometry of the film, and it is clear from the attached Exhibits, that it is erroneous to conclude that the use of a specific material implies a specific index of refraction of that material.

It is respectfully submitted that Andideh and Ang, alone or in combination with one another, neither disclose nor suggest a planarization method of inter-layer dielectrics or inter-metal dielectrics including the step of "forming on [a] lapped dielectric layer a cap layer of silicon nitrogen-oxide to have a refractive index of at least 1.6" (emphasis added) as does the invention of the subject Patent Application, as now claimed. Moreover, the references fail to disclose or suggest a recognition of the advantages of a cap layer having "a refractive index of at least 1.6" as have the Applicants of the subject Patent Application. Therefore, it is believed that the subject Patent Application, as now claimed, cannot be made obvious by Andideh in view of Ang.

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It is now believed that the subject Patent Application is in condition for allowance, and such action is respectfully requested.

Respectfully submitted,
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